



Breaking Stone with a Stick

SUBJECT: Art, Science (Geology), Social Studies

SKILLS: Knowledge, implementation, creation

STRATEGIES: Reading, estimation, inquiry, experimentation, invention

DURATION: 30-45 minutes

CLASS SIZE: Any, groups of two

GRADE LEVELS: 4-7

sponges or other ocean animals that have been fossilized. It was widely used by ancient people to make arrowheads, spear heads, and knives.

OBJECTIVES:

By studying various drilling techniques, students will gain an understanding of the progression of technology in the Americas. Students will also create their own "bead" through utilization of one of those methods.

BACKGROUND INFORMATION:

Soft rock is easy to cut; granite and the other hard igneous rocks are difficult. It is thought that ancient Native Americans first used the bamboo only to bore holes through a small stone or shell. Then perhaps later they may have attached a projectile points to the end of the bamboo stick in order to obtain a smaller and more precise hole. In addition to drilling through stones and shells for ornamental purposes, there is evidence that Native Americans have drilled through bones to make them into beads as well. These adornments may have been used for trading or ceremonial purposes, as well as in daily life.

Vocabulary:

Anvil: a large, flat stone used as a hard and sturdy medium on which to drill

Bow Drill: tool, shaped like that of a bow (as a bow and arrow) used by ancient cultures. It is used by back and forth movements and rotating the drill in the stone, so friction is caused. It was also used in fire making.

Chert: a very hard sedimentary rock that is usually found in nodules in limestone and is light gray to dark gray in color. It probably formed from the remains of ancient sea

RESOURCES/MATERIALS:

Several chert flakes and chert dust, a large flat stone, a bamboo stick, several pieces of shale, sandstone or slate for each group of students.¹

PROCEDURE:

- 1) Before the students enter the classroom, make sure that each group of two will have access to a bamboo stick. Each stick must have one straight, flat edge so that the drilling is easier for the students. This may be done by either sawing or sanding one edge. Also, sharpen the inside of that end of the stick. Place in the stick a piece of chert and rotate it so that the stick is still sturdy, but is big enough to hold the chert.
- 2) Tell each student to take one piece of shale (this is the easiest to drill through) and one piece of chert. Start a hole in the shale by manually whittling with the chert. This is more convenient so the drill will not slip. Once there is a starter hole, have a student place their shale on an anvil. The shale should be thick enough so that it will not break under the pressure of the drill, yet thin so that this activity can be completed in the allotted time.

¹Teacher's Note: Chert flakes and dust are obtainable at most hardware stores in the form of gravel. Bamboo sticks can be located in the marches or around ponds in Western Pennsylvania. They can also be purchased at craft stores. Caution should be used during this exercise. The students will be drilling with a sharpened point.

- 3) Now insert a chert flake into the flat edge of the bamboo stick. A pointed end of the flake should be protruding from the stick.
- 4) Place some chert dust on the surface to be drilled. This helps in grinding away the surface of the shale.
- 5) Start drilling by telling the students to rub the stick between their hands, turning the stick. Have one student drill as the other holds the bottom of the stick in place. This is easier so that the drill does not slip.
- 6) Periodically, tell the students to stop drilling and clear the shale of any shale dust. The rock will then be drilled through completely in this manner.

CLOSURE:

Based on this activity, have students share with the class their thoughts of how prehistoric people may have drilled through beads and shells. Perhaps this is a reason that they were used in bartering. Ask the students to hypothesize about the size of the holes in the stone. Which would make the most precise hole? Without using a chert flake, what would the hole look like? Again, without use of a flake, how long would drilling take? Examine students' drilling efforts for an evaluation.

EXTENSION:

A homework assignment may be for them to write an essay about what other tools may be made by drilling holes (wheels, weapons).



These are bone beads and a pendant from the Woodland period found in Somerset and Bedford Counties, in Pennsylvania.

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These are glass beads from the Contact Period, named for the time when Europeans and Native Americans came into contact with each other. They were found in Somerset and Bedford Counties in Pennsylvania.